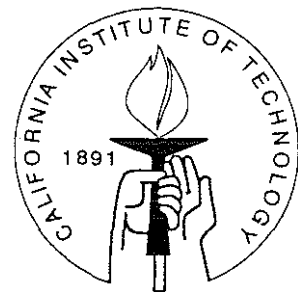


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The Political Economy of Government Debt in England (1693-1800): War, Liquidity, and Institutional Innovation

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Abstract: Economists and historians have offered several explanations for the significant fluctuations in 18th century British government interest rates. This article discusses their short-comings and supports the thesis that the fluctuations in interest rates were largely a function of England's participation in large-scale wars. The risks facing the government—being deposed in the event the war is lost or defaulting on loans because of a shortfall in revenues—hurt their "credit worthiness" in the eyes of investors. Thus, lenders demanded high interest rates to compensate themselves for investing in risky government loans.

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1. Introduction

The development of British capital markets has been the focus of a series of recent studies by both historians and economists. One phenomena in particular has captured the interest of researchers—the substantial decline in interest rates on government long-term debt in the early eighteenth century. Those rates fell from a high of 14% in 1693 to a low of 3% in 1726. While scholars unanimously agree that a sustained decline in long-term rates began sometime between 1693 and 1730, they offer different theories to explain the timing and the pace of the decline. For simplicity, these theories can be grouped into three categories: credible commitment (North and Weingast 1989), liquidity (Neal 1990), and revenue collection (Brewer 1989).

North and Weingast (1989) explain the decline in the interest rate on government loans in terms of the institutional innovations spawned by the Glorious Revolution (1688-1692). Before 1688 the Crown issued no long-term debt. Instead it raised a portion of its revenues through short-term forced loans—loans that did not require Parliamentary authorization. These

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relatively small loans were treated by the monarchy as the functional equivalent of taxes. The Crown even leveled severe penalties on those who chose not to "lend." Kenyon (1978), for example, asserts that in 1627, Charles I backed up a new forced loan using imprisonment as a means of coercion, successfully squeezing nearly £250,000 out of the nation in almost twelve months.

Moreover, the repayment of forced loans by the Crown was unpredictable. Ashton (1960) states that the forced loan of 1604-05 was still due as late as December 1609. In addition to being slow in making payments, the King, Ashton reports, defaulted on several forced loans, even though such defaults damaged his reputation and made it more difficult to borrow in the future.¹

North and Weingast argue that the reason the Crown did not engage in long-term borrowing before 1693 was because of an inability to make credible commitments. It was not until the institutional innovations resulting from the Revolution emerged, that placed Parliament in charge of the purse and led to the establishment of the Bank of England, that the government was able to float long-term debt. In North and Weingast's view, these changes, constraining the monarchy "to obey a set of rules that [did] not permit leeway for violating commitments", reshaped fiscal and government institutions, and tied the monarch's hands (p. 804). The result was a new relationship between the Crown and potential lenders—a relationship that was immediately reflected in the form of a sharp drop in public long-term interest rates after 1694.

Neal (1990) presents an alternative explanation for the decline in interest rates. Beginning in 1693, the British government acquired additional revenues by issuing non-callable, "life" annuities. These assets were typically 99 years or more, funded by taxes, and could not be passed down to heirs without a change of title. According to Neal (1990) these assets were also highly illiquid, creating problems for their owners "because of the awkwardness of transferring title on these securities from one owner to another...annuity holders could not easily realize their implied capital gains." (p. 13) They also created difficulties for the government because they were non-callable; that is, the government could not redeem them earlier than the original date

¹ Defaulting through inflation was not chosen by the government at this time, evidenced by the steady price level over the period from 1650 through 1750. See Mitchell (1962, pp. 468-469) for a price index.

specified (usually 99 years). Thus, the government could not take advantage of declining interest rates in the short-run, which cost them a great deal because most of the annuities were issued at very high interest rates. The government offered the annuities at high interest rates because investors would not purchase assets that were highly illiquid unless they were compensated for the risk of owning such assets.

Neal posits that the disastrous South Sea incident fortuitously led to a solution to the liquidity problem. The government enticed annuity holders to transfer their long-term assets into South Sea Company stock—stock that was experiencing rapid appreciation. Investors agreed to convert, according to Neal, because the new assets were liquid and promised significant financial gains. Unfortunately for the investors, the "Bubble" burst and prices plummeted. The Bank of England saved the market from utter chaos by converting South Sea stock into a new form of easily transferrable annuities. These new assets were long-term, perpetual annuities with the desirable characteristics of being callable, more easily transferrable, and funded by tax revenues. Lenders no longer needed to be compensated with high interest rates for investing in highly illiquid assets because the new debt instruments were much more liquid:

These new annuities (e.g., three-percent consols) attracted the public because of the relative ease by which it could be acquired and disposed of, the clear terms of the interest payments and the readily available information about its current price...(Neal, 1990, p. 14)

By the middle of the eighteenth century, the consols became the primary instrument through which government long-term debt was issued. Neal credits the government's abundant use of these new liquid assets for the sustained low interest rates after 1727.

Brewer (1989) offers a third, somewhat different explanation for the decline in long-term government interest rates. After the Glorious Revolution, Parliament relied on taxes (indirect and direct) and loans (short-term and long-term) to provide revenue for the government. Short-term loans were unfunded, and they were paid sequentially.² These two characteristics created a great deal of problems for the lender—the lender was forced to wait until it was his turn to be repaid,

² As each lender purchased an asset, his name was written in a log. Each lender would be repaid in the order that his name appeared in the log.

and, because war expenditures and the interest on the current national debt demanded most of the state's tax revenues, this wait was often longer than he originally anticipated. Brewer summarizes this point:

As the size of the short-term debt increased, so it took longer for creditors to cash their departmental bills. It became harder or more expensive for the government departments to secure goods on credit because suppliers knew that the size of the debt lengthened the time they would have to wait for repayment. (p. 116)

The problem caused by unfunded, sequential repayment was temporarily avoided by converting short-term debt into long-term loans. Long-term loans, as their name implies, did not require repayment of the principal as quickly as short-term loans. This conversion, however, created a new problem—funding the long-term debt. To prevent defaults on loans, as had occurred in the past, the Parliament promised to back them with tax revenues. Thus, the success of long-term government loans depended crucially on the effectiveness of the tax system. As Brewer (1989) writes, "The repeal [of taxes backing up a loan], thereby removing the security of a particular stock, would have been a gross breach of public confidence and a threat to the security of public credit." (p. 119)

The tax system was revised significantly after 1713. In particular, the Treasury came to rely heavily on indirect taxes (e.g., excises) rather than direct taxes (e.g., land taxes). According to Brewer, the excise tax became the tax of choice for the English Parliament because "it was a comparatively discrete tax levied on a sizable but limited number of commodities" for which there existed a sustained (i.e., inelastic) demand (e.g., necessity goods) (Brewer, 1989, p. 101). This new type of tax and method of collection stabilized revenues and gave lenders a sense of security (beyond a verbal pledge by Parliament) that their loans would be repaid in full and on time. The government no longer had to offer extremely high premiums as it did in the 1690s—lenders did not face as high a risk of default as it did then and therefore did not require compensation. Thus, Brewer credits the transformation of the tax system for the sustained decline in interest rates after 1713.

All three theories described above have problems, either in the logic of their argument, the empirical methods they used, or both. North and Weingast claim interest rates declined substantially after the Glorious Revolution, but they do not have any pre-Glorious Revolution

data upon which to make this comparison. Only short term loan rates are available before 1688, and they cannot be used to approximate what long-term rates would have been, particularly because several short-term loans were forced—far more a tax than a loan. They claim that a post-1694 drop in long-term interest rates was due to the new institutional situation (in particular, the creation of the Bank of England), but without any pre-'innovation' long-term interest rates to compare with, it is hard to substantiate their conclusion.

Second, it is difficult to believe that majority rule institutions are able to commit to any long-term agreement. Kiewiet and McCubbins (1991), for example, examine Congress' inability to commit themselves to a budget—actual deficits always exceed the "binding ceilings" passed by Congress. They state that:

Members of Congress cannot commit either themselves or future Congresses to binding levels of revenues, spending, or deficits. They cannot do so through structure...nor through any formal procedure....Although Congress has made spending decisions under the auspices of many different procedures and organizational arrangements, none have served to prevent congressional parties from pressing on with their policy priorities. (Kiewiet and McCubbins, 1991, p. 90)

In recent years, more often than not, Congress has either deactivated budget enforcement provisions that it previously established or has provided enough loopholes so that the ceiling would not be quite so binding (e.g., certain parts of the federal budget, such as federal pensions, were immune from automatic spending cuts specified in Gramm-Rudman-Hollings) (Kiewiet and McCubbins, 1991, pp. 83-84). The same hand that locks the door also holds the key to reopen it when needed.

The constant opening and closing of the "spending" door is the byproduct of a politically divided institution governed by majority rule. The British Parliament of the seventeenth and eighteenth century was no closer to being a homogeneous voting body than the present U.S. Congress. It was composed of many factions—factions usually based on the Tory and Whig party lines. Each party tried to undermine the power of the other and set its own agenda by manipulating the Crown and the Treasury (Plumb 1967). Given that majority rule governments today (like the U.S. Congress) find it difficult to honor commitments, it is hard to believe that

over two centuries ago Parliament was, without question, able to honor all of its long-term loan agreements.

One might argue that the incentives to cooperate might change if the members of Parliament themselves were heavily investing in government annuities. If this point was true, then Parliament would be more likely to honor its promise to back all long-term debt to insure that its members would receive their profits from the investment. Members of Parliament (or individuals representing them), however, do not appear to have held a majority of government long-term debt (at least not before 1715). For example, Dickson (1967) reports that merchants invested heavily in the 1697 long-term loan. Most members of Parliament invested their money in land, and thus, were concerned with affairs that might affect them due to their land holdings (e.g., land taxes and the Land Bank proposal).³ They did not have their own interests to protect as far as investment in government long-term annuities was concerned; therefore, they would not have been more motivated than predicted above to honor their commitment to earmark long-term debt.

Finally, the method North and Weingast used to measure the decline in the risk due to the lack of commitment associated with government loans is problematic. To properly test for a decline in the riskiness of an asset, the asset must be compared to a similar, but less risky one. A decline in government long-term interest rates need not have been the result of reduced risk, if the rates on similar, less risky investments were declining at the same rate.

In contrast to North and Weingast, Neal believes that high interest rates were demanded because these long-term loans were very illiquid. Once a secondary market developed, the risk involved with purchasing long-term debt diminished; thus, investors no longer demanded such high premiums, and the interest rates on public long-term loans declined. Indeed, from 1693-1726, government nominal rates declined substantially; however, rates on private long-term loans did not fall.

³ The ill-fated Land Bank was created to serve as an institution through which long-term paper bonds could be issued against the security of land. Its creators (primarily Tories in Parliament) wanted "ready money for the state and gentleman, not long-term loans on the security of land such as modern mortgage banks offer" (Clapham, 1944, pp. 33-34). The bank never succeeded in this endeavor and was dissolved in 1697.

These private assets were callable, long-term loans, with term lengths of 99 years or more. Although they were governed by usury laws that prohibited the interest rates tied to them from rising higher than 5% or 6%, for most of the period, the rates rarely reached these levels.⁴ More important, the private market suffered from many of the same liquidity problems as the public market because most loans were hard to sell or transfer. Clark (1988) highlights the illiquidity problem by showing that no well defined secondary market existed to bring together buyers and sellers. Hence, we would expect lenders to react similarly towards purchasing private or public debt. That is, if Neal is correct, then in the early period (pre-1720) we should see lenders demanding a premium on the illiquid, private, long-term debt and, in the latter period (post-1730—after capital markets have become fairly well-developed), lenders no longer demanding such high premiums. Private rates, however, fluctuated between 3% to 5% from 1693 to 1800 with no apparent downward trend. Lenders do not appear to have demanded a premium in the private markets for illiquid long-term debt as they did in the public markets.

Additional problems with Neal's liquidity argument still need to be addressed. For example, the long-term loans of the 1690s and early 1700s provided substantial profits for lenders. Why would investors want to sell an asset, one that guaranteed them the highest possible yield for this time period, especially if they saw interest rates declining, on average? Only the risk that the government would not meet its interest payments or the appearance of a more lucrative asset to invest in seem legitimate answers. Indeed, the government realized the latter point and made investment in South Sea stock appear quite appealing so that lenders would willingly convert their annuities into stock. Brewer (1989) concurs:

The chief obstacle to such a scheme [converting government annuities into South Sea company stock] was...[that] the holders of the irredeemable [non-callable] annuities...needed to have a motive to relinquish their high return securities. (p. 125)

The lenders chose to convert their assets into South Sea company stock, creating the Bubble, because it appeared that the new investment would bring them even higher returns than

⁴ From 1651-1714, the usury limit was 6%. After 1714, it dropped to 5% (see Homer, p. 126). From 1688-1760, private rates hit this ceiling only three times.

their long-term annuities (see Dickson, 1967, for a detailed account of the South Sea Bubble). If lenders valued liquidity as much as Neal implies, then the government would not have had to entice them as they did to convert their long-term illiquid assets. Thus, it was the profitability of the scheme more than the gain in liquidity that led lenders to convert their lucrative long-term annuities into South Sea stock.

Moreover, after 1693, the English Parliament, which controlled the government's purse, was particularly cost-conscious. Their "promise" to earmark revenues to cover long-term debt issued was intended, in part, to control excessive government spending—a trait of the early Stuarts that they did not wish to emulate. In keeping with this philosophy, Parliament presumably would have chosen the most inexpensive instrument available when it issued long-term debt. Thus, if illiquidity was the principle cause of costly high interest rates on government long-term debt, we would expect Parliament to have issued debt that was liquid in the first place or to negotiate new terms with lenders to make the loans more liquid.⁵

From 1693-1715, however, Parliament chose large denomination, long-term annuities and actually converted much of the more liquid short-term debt into long-term, highly illiquid annuities (Dickson, 1967, p.116). We must conclude, then, that the extremely high interest rates of the early long-term annuities were not principally caused by illiquidity. Lenders did not demand a premium on long-term loans because of their illiquidity, otherwise, we would have found Parliament issuing more liquid debt to avoid paying such high interest premiums. Indeed, if investors were primarily worried about illiquidity, then the government would not have had to offer such a lucrative investment opportunity to get investors to convert their highly illiquid, long-term annuities into more liquid debt (e.g., South Sea stock). Thus, while increased liquidity made buying and selling of assets easier, Neal's argument does not explain why the government would use such a costly instrument to collect revenue, why the government had to entice

⁵ Illiquidity is not a problem if investors can borrow against the paper debt, as they do today. I was unable to locate any evidence of such transactions occurring over this time period. The lack of evidence implies that capital markets were either not developed enough to allow this type of transaction to occur, government annuities were considered too risky to allow owners of such debt to borrow against them, or such transactions did occur, but I failed to locate evidence of them.

investors to get them to convert their highly illiquid, long-term annuities, or why the interest rate on long-term debt still fluctuated significantly after 1719 (from 3% to almost 6% on government consols).

Brewer's argument, while plausible, is also problematic. Brewer claims that the revised tax system stabilized government revenues, thereby decreasing the risk of government default on loans. He believes investors acknowledged the decline in risk and, thus, no longer demanded high interest rate premiums. Stabilized tax revenues, therefore, led to lower, sustained interest rates. The tax system Brewer describes, however, is endogenously related to the interest rate premium. If the risk of lending to the government increased, and lenders demanded a premium to be compensated for the increased risk, then the government would need to earmark more revenues to meet the higher interest rate payments. One way to do this is by increasing taxes. Thus, we have both stabilized tax revenues lowering interest rates and high interest rates increasing tax revenues. This endogeneity problem makes statistical testing difficult because we cannot identify the direction of causality or even if it is appropriate to try to define the problem this way.

In addition, Brewer states that stabilized tax revenues significantly lowered the risk that the government would default on its debt. This statement is true as long as the government does not subscribe loans to the limit of its revenue source. If it subscribes to the limit and there is a revenue shortfall, then it may default on its debt. Indeed, if the government has no incentive to limit its spending, then the risk of default exists no matter how much tax revenue it collects. The only spending "safeguard" for the British government during this era was the promise to fund long-term debt—but this promise, under a majority-rule system, is not binding. Thus, while Brewer's argument seems plausible at first glance, it is not only difficult to test because of an endogeneity problem but it also does not address how binding (if at all) were government spending limits.

After reviewing Brewer's argument, as well as North and Weingast's and Neal's, we find ourselves ~~questioning the answers~~ they have offered us. Their hypotheses are beset by numerous problems. Keeping this in mind, this work will make use of historical documentation as well as quantitative methods to test a new hypothesis: the risk premium (and interest rate) fluctuations following the Glorious Revolution were primarily a function of financing a series of large-scale

wars—not the lack of credible commitment, illiquidity or tax revenue instability, but the risks associated with waging war. These risks—the Crown being deposed by adversaries (particularly foreign ones) in the event of losing a war and the government defaulting on its loans because of the great financial burden placed on it during wartime—contributed by far the most to the fluctuations in the risk premium, making the English government appear less credit worthy to investors and, subsequently, costing the government a great deal to issue debt.

2. Overview

This analysis incorporates several research techniques to advance the argument that England's involvement in large-scale wars largely explains the fluctuations in the risk premium demanded for government loans.⁶ First, the historical overview links the political turmoil during the period to the financial instability of England. In the seventeenth and the eighteenth centuries, England was involved in a series of major wars (Table 1), and the need to finance military activities placed significant financial demands on the Crown. Because of advances in military technology by the end of the seventeenth century—the introduction of the musket, the development of large standing armies, and the adoption of "more ambitious and complex strategies designed to bring these larger armies into action"—the costs associated with waging war rose steadily, and tax revenues were not sufficient to cover them (Parker, 1988, pp. 1-2). It became increasingly difficult to finance a war. The problem was magnified by the failure of Parliament and the Crown to agree on the method for raising revenues.

Before 1688 Parliament's main source of influence came from its right to approve new taxes. Though the King had considerable discretionary power over how revenues were raised and spent, he needed Parliament's consent to increase tax revenues. Parliament, comprised mostly of large landowners who disliked higher land taxes, refused, with increasing frequency, to agree to raise direct taxes (e.g, land taxes) (Kenyon, 1978, p. 39). To obtain additional funds, the King

⁶ Barro (1987) examined the relationship between military expenditures and government long-term interest rates (post 1729). His results support the theory that military expenditures affected fluctuations in government interest rates, but does not attribute this to any risks the government is facing, nor does he test his results in a similar fashion.

borrowed extensively, but he often was slow or even failed to honor his financial commitments. Defaults, however, made future borrowing both more difficult and more costly—the high interest rates charged on Crown loans surely reflected at least in part the uncertainty of repayment.

In addition, the probability that the current monarch would be deposed by a foreign power rose substantially during war. This was particularly true during the Nine Years War (1689-1697) against France. In 1688 after William III and his army invaded England and took control of the country, James II fled to France for safety. Louis XIV backed James II; therefore, the threat of James II returning to power—an event that would occur if France defeated England—and of reinstating the Crown's monopoly on all government policies, was real. People did not want to fund a soon-to-be-deposed monarch or government system. The Treasury had to offer high interest rates if people were to invest despite their fears.

Thus, the interest rates charged the government for loans may have reflected both the risk of default by the government as well as the risk of default rooted in a potential change in government power (particularly after losing a war). The greater the degree of risk involved, the higher was the interest rate charged to the Crown relative to the "risk-free" rate. The high rates charged on Crown loans, and the problems inherent in obtaining any loans at all, persisted well into the eighteenth century.

The graphical comparisons and econometric analysis provide additional quantitative evidence that the fluctuation in the interest rate premium over the period was in response to the risks associated with war. A decline in long-term government rates alone may not reflect a decline in risk if rates on a similar, less risky asset are declining as well. Hence, a better measure of risk than that proposed by North and Weingast is the difference between the interest rate on two similar assets—one risky and one riskless. Since no entirely riskless asset exists, this analysis uses a relatively safe asset—land based life annuities (hereafter known as private long-term loans)—to measure the risk premium associated with risky government loans. Graphs of both rates show the trend in the risk premium over the period.

Per capita military expenditures—a proxy for the level of the government's war-time involvements—and dummy variables representative of the three theories discussed in this paper are incorporated in both a graphical and econometric analysis designed to examine the relationship between these factors and the risk premium, primarily to show which factor accounts

for most of the variation in the risk premium.

The quantitative analysis will show that from 1693-1800, the risks associated with defeat in war were reflected in the premium charged on government loans. That is, lenders will try to compensate themselves for the risk by purchasing long-term debt if the interest rate is high enough to outweigh the risk factor. Other factors that could possibly affect the interest rate premium—such as a credible commitment on the part of the Parliament, greater asset liquidity, or a stabilized tax system—play smaller roles. If there exists a strong correlation between the instruments cited above (i.e., interest differential and war expenditures), it will provide support for the thesis that factors other than liquidity or institutional innovations played a significant role in shaping the structure of the pre-industrial market for government debt.

3. Methodology and Results

To properly analyze the decline in the interest rate premium, we would ideally compare rates on two similar debt instruments over a fairly long time span. Unfortunately, no such series exists. The data from 1650-1693 are very limited—neither non-callable nor short-term private loan rates are available. While long-term private annuities are available, the first government long-term loans did not appear until 1693; therefore, any quantitative analysis is restricted to the post-Revolutionary period. Government short-term rates are scarce from 1650-1800, and nothing comparable exists on the private side.

From 1693-1750 most government interest rates were tied to long-term, non-callable annuities, and private interest rates came from land based, long-term, callable annuities. Both types of annuities required yearly payments to the lender and were usually contracted for term lengths of 99 years or more (hence, these loans were known as "life" annuities). With callable annuities, however, the borrower could repay the loan earlier than the date specified in the original contract (Neal, 1990, pp. 93-94). While the term length on the government loans is similar to the private loans, the redeemability of the latter clouds immediate comparisons between

the two.⁷

Also, expected short-term rates cannot be used to generate long-term rates because these two debt instruments are not directly comparable. While the expectations hypothesis of the term structure of interest rates leads to the conclusion that investing in short-term bonds gives exactly the same expected return as investing in long-term bonds, the theory says nothing about risk (Brealey and Myers, 1990, pp. 572-3). If government long-term loans were available prior to 1688, a lender who invested in them would face greater risk than a short-term investor. If the King was replaced by a non-hereditary ruler (i.e., someone outside of the royal family), the new King did not necessarily have to honor the previous monarch's contracts; thus, lenders would risk non-repayment if they made long-term loans to the government.

Even when hereditary succession occurred, rulers did not always behave responsibly. For example, during the reigns of James I and Charles I, forced loans were collected but not repaid on time or in full. Hereditary succession did not make either James I nor Charles I more responsible towards his commitments. This flagrant attitude towards the repayment of loans contributed to the latter ruler's overthrow and execution. The frequent turnover of rulers in the seventeenth century—from the Stuarts to Cromwell back to the Stuarts and then to the House of Orange—did not guarantee continuity in policies, especially since many of the new rulers gained office after their predecessor had been overthrown. Thus, the risk involved with lending on a long-term basis makes it impossible to equate expected short-term with long-term rates. Short-term rates, therefore, cannot serve as a proxy for long-term rates before 1693.

If one assumes, however, that immediately following the Glorious Revolution funds were always borrowed for use in the near future, then a rough comparison can be made between callable private rates and non-callable government rates of the same term length. If interest rates fell, borrowers would call in their callable loans and recontract at the now lower rates. If, however, interest rates rose, borrowers of callable loans would not recontract; thus, their behavior would be the same as borrowers of non-callable loans. Lenders would also treat the two types

⁷ The government made their annuities non-redeemable to make them more attractive to lenders; thus, lenders benefitted if interest rates declined because the government would be locked into the higher rates. This situation is precisely that which occurred in Britain from 1690-1715.

of loans differently—the difference depending on whether they expected interest rates to rise or to fall. They would charge a premium on callable loans, if interest rates were expected to fall, else they would lose even more money to borrowers recontracting at the new, lower rates.

Thus, if we compared private callable with private non-callable debt, the interest rates of the former should never fall below the interest rates of the latter because of the premium charged by lenders for callable loans. As a result, the risk premium associated with government loans (i.e., the interest rate differential) may be underestimated; however, even if the size of the interest risk premium is biased downward, the results of this analysis remain significant.

Figure 1 shows that the government long term rates, while declining, do not converge with private rates until 1715, and after that year, periodically fluctuate above private rates.⁸ The first few observations of government rates—as high as 14%—are surely due to the uncertainty regarding the long-term survival of the new government (see Table 2). The interest rates on the primary source for government borrowing before 1693—short term loans—ranged from only 6% to 10% in the decade before the Revolution.⁹ The premium associated with the 1693 and 1694 observations capture a heightened measurement of risk. If William III and his militia had lost the Nine-Years War, James II would have been reinstated as King of England. A strong believer of "the Divine Right of Kings", James II would have returned as sole authority over government policies, eliminating or certainly curtailing Parliament's role in most financial matters.

Great uncertainty existed regarding William III's ultimate success. The 1693 loan was issued by Parliament following significant French victories in the Netherlands. Louis captured Mons in 1691 and the fortress of Namur in 1692 (Harris, 1963). The 1694 loans were issued in close succession following the bloody defeat of the British army at Landen. In both instances a defeated William came back to Parliament to request additional revenues to increase the size of his army—an army that was substantially smaller than that of the French. Many of the members of Parliament as well as the general populous were dissatisfied with William III's

⁸ The points graphed in the figure are the exact data points collected (53 points total). Linear interpolation was used to fill in gaps.

⁹ See The Calendar of the Treasury Books, Vol. VII and VIII, pp. 64, 303, 380, 436, 604, and pp. 73, 285, 334, 388, respectively, for some examples.

performance as King of England (they believed that he put Dutch interests ahead of English during the Nine Years War). By examining Figure 1 and Table 2 closely, we see a pattern developing. The early long-term loans, issued by Parliament primarily to fund the Nine Years War, carried interest rates significantly higher than those loans issued after the war concluded. A significant military setback preceded most of the high interest loans issued between 1693-94. After the war concluded, however, Parliament raised £2,000,000 by issuing an 8% annuity. The loan was fully subscribed without any difficulties, unlike the 1693 and 1697 war-time loans which did not attract investors. Thus, the drastic decline in long-term interest rates was not a result of either Parliament's credible commitment or the creation of the Bank of England, as North and Weingast suggest. The risks the government faced during the War, particularly that it might be overthrown and James II reinstated as King, drove investors to demand compensation (in the form of high interest rates) for investing in government debt, particularly after significant military setbacks. Once peace was declared, long-term interest rates declined.

In addition to the uncertainty regarding the war and the monarchy, the system of earmarking revenues to support particular loans was still in its infancy—Parliament was struggling to maintain its commitment to back loans to the Crown. The financial demands placed on the government during the war greatly exceeded the revenues coming into the Treasury. Thus, the uncertainty of loss of war and dissatisfaction with William combined with fears regarding the ultimate redeemability of the loans to produce the very high premium on the first public long-term loans issued in the early 1690s.

In 1709, a series of events led to a near crisis in the English government, and they explain the resurgence of high interest rates in 1710-1712. Dickson (1967) summarizes these events:

By Michaelmas 1710 the debt amounted to well over £6m., about a year's revenue. Simultaneously, the triumphant military and economic progress of the Allies began to falter. The failure of the negotiations for peace at the Hague in August 1709 was followed in September by the bloody and equivocal battle of Malplaquet. Further, the iron winter of 1708-9, which froze the rivers all over Europe, paralyzed commerce...In 1709-10 the bankruptcy rate rose sharply in London and Amsterdam.

These shocks to the delicate spider's web of European commerce were bound to affect the credit of the English government, particularly as rumours grew in the early months of 1710 that Godolphin [the finance minister] was about to be dismissed. (p. 362)

The uncertainties surrounding military defeat, temporary trade disruption, and governmental upheavals combined to produce the high rates demanded by lenders on government long-term loans during the period. "With the approach of peace in 1713", Dickson (1967) states, "it was possible to reduce the interest on Land Tax loans to five per cent" (p. 363). In addition to the Land Tax loans, the government long-term loans issued after 1712 also reaped the rewards of peace—substantially lower interest rates.

Large drops in nominal government rates occurred at the end of other wars as well. Once conflict was resolved and peace declared, the demands for additional revenue lessened. Without the uncertainty of the war's outcome, Parliament no longer needed to offer so large a premium to attract risk-averse investors. The lack of large war demands was reflected in the sharply lower rates offered for loans in 1697, 1713, and, to a lesser extent, in 1749, 1763 and 1784.

Moreover, contrary to the North and Weingast argument that the drop in interest rates was a sharp, downward trend, an examination of **real** long-term government rates indicates otherwise. To adjust nominal rates for inflation, an expected inflation rate was calculated from an adjusted price index. The expected rate was calculated as a weighted average of recent changes in a yearly price index ($p_t - p_{t-1}$). The weight—distributed over five year intervals—reflected the influence of each year on future inflationary expectations.¹⁰ A five year weighting scheme was chosen because five years seemed long enough to pick up any possible lagged expectations regarding changes in prices. A two year weighting failed to capture the lagged effects and a ten year one added very little new information.¹¹ The resulting estimates of the real rate (Figure

¹⁰ Three different weighting schemes were computed:

- (1) **An equal weight**—each year influenced inflationary expectations equally; thus, each year's price differential was multiplied by .2.
- (2) **An increasing weight**—the earliest year in each five year interval influenced expectations least; thus, each year in a five year period was multiplied by the increasing series 1/15, 2/15, 3/15, 4/15, 5/15, respectively.
- (3) **A decreasing weight**—similar to the increasing weight except the last year in each five year interval influenced expectations least; thus, the series of weights used were 5/15, 4/15, 3/15, 2/15, 1/15, respectively.

¹¹ The average inflation rate over the entire period is constant; however, especially early in the period, there are year to year fluctuations in the price indices. These fluctuations

2) support the conclusion that a sustainable downward trend in government long-term rates and the interest rate differential does not occur until after the end of the War of the Spanish Succession (1713). The differential rises noticeably during the other major wars of the eighteenth century—the War of Austrian Succession (1739-1748), the Seven Years War (1756-1763), and the American War (1775-1783).

In the analysis of the relationship between military campaigns and the premium charged for government loans, an index of military expenditures was used as a proxy for the level of the government's military involvement.¹² No national income figures exist for this period; therefore, a crude measure was calculated using yearly wage figures multiplied by the total population size.¹³ Total military expenditures were then divided by this estimate of national income to obtain an approximate index of relative military expenditure.¹⁴

After 1688 the Crown was required by law to obtain Parliamentary permission for **all** new loans including loans needed for military expenditures. Often permission to market these large loans was granted in rapid succession—some were separated by only a week.¹⁵ Loans for the purpose of supporting the Nine Years War against France, for example, were issued on 8 February 1694, 23 March 1694, and on four occasions during April 1694. William III requested money from Parliament as he needed it to continue his military campaign; there was no attempt to accurately forecast future military expenditures during this period. The same lack of planning appears to have characterized the reign of Queen Anne and to a certain extent, of King George I.

cancel each other out when an average inflation rate is calculated.

¹² A record of England's yearly military expenditures has been kept by the Department of the Treasury since 1688. See the British Parliamentary Papers (Vol. 35) for an exact breakdown of all military expenditures.

¹³ The nominal wage series and population figures can be found in Wrigley and Schofield's The Population History of England (1541-1871), Appendix 9, pp. 638-641, and Appendix 3, pp. 527-535; respectively.

¹⁴ Dividing military expenditures by population only would yield a comparable per capita military expenditure measurement because wages were fairly constant over the period.

¹⁵ Interest rates and military expenditure data are available from the author upon request.

Moreover, the loans were most often well in excess of the expected state revenue in the year that they were required. Government income, obtained mostly through various taxes, rarely covered the loan requests (Dickson, 1967, pp. 50-52). Thus, any risk associated with these loans should be reflected in the premiums of the same year. If a loan for military purposes was requested in 1693, the credit markets would reflect this demand in the interest rate charged for loans in 1693. The interest rate differential was, therefore, regressed on military expenditures of the same year.

In addition to military expenditures, dummy variables were included in each regression to represent the theories posed by North and Weingast, Neil, and Barro. To estimate the long-run effect of an event on the interest rate differential, a dummy variable representative of the entire period following each event was created; for example, if the Bank of England was created in 1694, the dummy variable would cover the entire time-span following its creation. This method of analysis should provide an approximation of each event's long-run effect on the differential. The three dummy variables are as follows:

- 1) **d(1697-1800)**: The institutional innovations that North and Weingast (1989) claim forced the government to credibly commit—placing Parliament in charge of the government's purse and creating the Bank of England—were fully established by 1697. If these institutions explain any changes in the interest rate differential, their effect should be captured in the coefficient of the dummy variable defined for the period following 1697. While the historical analysis conducted above significantly diminishes the strength of their argument, a dummy variable was created to quantitatively test their argument.
- 2) **d(1714-1800)**: Brewer claims that the period beginning with the succession of George I was particularly important for England's financial revolution because the tax system was revised. By relying primarily on indirect taxes, the government could appoint its own professional employees to administer the tax, rather than deal with the "hodge-podge of amateur and local officials" who handled the collection of land taxes (Brewer, 1989, p. 100). Thus, a dummy was created to capture the renovation of the tax system.

- 3) **d(1726-1800)**: The period following the South Sea Bubble was marked by the increased liquidity of government assets. Neal credits the creation of a secondary market for the sustained downward decline in government interest premiums witnessed after 1721. The dummy variable reflects the period beginning with the issuance of the first government "consols"—treasury bonds that were highly transferrable.

The interest rate differential was regressed on military expenditures and different combinations of the dummy variables. A test for multicollinearity of the independent variables revealed no problems of this type. Neither first nor higher order serial correlation was detected. The results are reported in Table 3. From the results of the first regression, we see that military expenditures are significant at the 95th percent level—they appear to explain at least part of the changes in the interest rate differential (i.e., the null hypothesis that $\beta=0$ can be rejected). The variable's positive coefficient indicates that as military expenditures rise, the interest rate differential rises also. To provide a more tangible measurement of the effect that a change in military expenditure would have had on the differential, the greatest change in military expenditure over the period (maximum expenditure - minimum expenditure) was multiplied by the β coefficient obtained from regressing the interest rate differential on military expenditures. The result obtained reflects a change in the interest rate differential equal to .03 per observation for the regressions. These figures are equal to about a **30%** change in the interest rate differential over the period. Thus, the largest drop in military expenditures over the period appears to have accounted for about one-third of the drop in the interest rate differential. Military expenditures explain more of a change in the risk premium on government long-term interest rates than any of the dummy variables. In the second regression, the period variables for 1697-1800 and 1714-1800 were significant while in the first regression, the variable for 1726-1800 was not. While the North and Weingast dummy variable was slightly larger than the Brewer dummy variable in the second regression, the difference between the two is insignificant.

The size and significance of the dummy variable coefficients, however, are questionable for two reasons. First, the regression is biased towards the dummy variable with the longest time-span, the North and Weingast variable. Because the data series declines greatly between

1693-1715, the dummy variable that covers the largest portion of the time series will pick up this decline most efficiently, whether it actually explains the decline or just happens to occur simultaneously with the decline. Thus, the North and Weingast dummy variable will explain this downward shift the best because of the way it was defined, and not necessarily because it was the greatest cause of the decline.

Second, the significance and the size of the North and Weingast coefficient hinges on the first two observations. If we remove the 1693 and the 1694 data points, the significance of the North and Weingast variable disappears and its coefficient size drops dramatically (see the third regression). The government interest rates, from which these first few data points were calculated, were exceptionally high. The political and economic unrest that most certainly affected the interest rates, unfortunately, can not be separated from the events North and Weingast describe by using dummy variables; however, if we eliminate these two data points, the North and Weingast coefficient becomes insignificant. The lack of consistency in the size and significance of this coefficient makes its use as a measurement of the validity of the theory questionable.

Another, more tangible method of analyzing how well the independent variables explain the interest rate differential is to compare the predicted values for the differential from the regressions against the actual values. If the predicted values closely follow the actual values, then the independent variables included are good estimators of the interest rate differential.

We can compare how well military expenditures alone predict the differential by regressing the differential on military expenditures separately from the period variables and then plotting the predicted values of this regression against the actual interest rate differentials. If the predicted values follow the actual values closely, and if there is little difference in the plot of the predicted values using all the variables and the plot using just military expenditures, then most of the variance in the interest rate differential can be explained by changes in military expenditures.

The results are found in Figures 3-6. Figure 3 depicts the plot of predicted values from regressing the interest rate differential on military expenditures and the dummy variables for the periods beginning in 1697 and 1714. Figure 4 shows the predicted values from replacing the 1697-1800 variable with the 1726-1800 variable. Figure 5 depicts the regression with military

expenditures alone and Figure 6 displays the regression with military expenditures and the 1714-1800 dummy variable. A comparison of the plots indicate that military expenditures drive the results in Figures 3, 4, and 6. Comparing Figures 4 and 6, we see that the only additional explanatory power gained by including the Neal variable is for the first two observations. The North and Weingast variable (1697-1800) adds little additional explanatory power. Military expenditures and the Brewer variable capture about the same degree of variation in the predicted interest rate differential as the predicted series generated from military expenditures and the North and Weingast variable.

Thus, events associated with the 1726-1800 variable do not appear to have driven the interest rate differential down significantly, and while the other two variables explain the decline better, the coefficient for the North and Weingast variable is not consistent when the first two data points are not included. Though North and Weingast credit the institutional innovations of the post-Glorious Revolution era for the sharp decline in government rates, the test results reveal that if data prior to the creation of the Bank are removed, then the innovations are no longer a significant factor in lowering rates. The Brewer variable appears to explain a portion of the decline in interest rates, but as mentioned above, this result is questionable because the dummy variable may have picked up the overall decline in interest rates without actually being responsible for it.

Military expenditures as a percentage of national income, however, did strongly affect the decline in the differential, a relationship that suggests the differential was, in part, a product of war fears. Examining this relationship more closely, we concur with Barro (1987) that fluctuations in government long-term rates and military expenditures are strongly related. The same relationship, however, does not hold with private interest rates and military expenditures. This result along with the fact that the private rates rarely hit the usury ceiling allow us to reject the notion that government debt was crowding out private long-term investment.¹⁶

¹⁶ Crowding out may occur when the government is issuing large amounts of debt at high interest rates. If such an event took place in England during wars, we would expect to see private rates fluctuating with war expenditures and hitting the usury ceiling frequently. From the interest rates collected, we found no evidence of such events occurring; therefore, we may conclude that crowding out did not play significant role in British

Because crowding out does not play a role in the financial markets, fluctuations in the risk premium over the period largely can be attributed to the government's credit worthiness as perceived by investors. Large-scale wars damaged this worthiness because of the "risks" facing the government: the possibility in the early wars of the government being overthrown and the high probability it would still default on its debt obligations. Thus, the downward drift in the interest rate differential that occurred after 1713 and, also, to a smaller extent after 1749, 1763, and 1784, was not primarily the result of a credible commitment by Parliament, the increased liquidity of long-term assets, or the stabilization of the tax system but of periods of peace that allowed the government to repair its credit worthiness damaged by wartime risks.

4. Conclusions

North and Weingast, Neal, and Brewer fail to credit the significant influence of war on the risk premium. The Crown faced substantial risk when England engaged in war with other countries. The chances of military defeat were not insignificant; and lenders to the Crown knew that, if a foreign government took control, the likelihood of being repaid was small. Dickson suggests governmental instability as one reason that long-term government loans were looked upon with much skepticism before the Glorious Revolution—frequent wars dispelled dreams of profitable long-term investments in the government (Dickson, 1967, pp. 46-47).

The other component of risk was default. North and Weingast suggest that the government's credible commitment secured by the set of institutional innovations caused the sharp decline in government interest rates. When examined more closely, however, the evidence suggests a slow decline in interest rates. If credible commitment alleviated most of the risk associated with government loans, then government rates should converge on private rates sooner than 1715. Moreover, the results of regression analysis show that when the first data points are omitted, the institutional innovations of the immediate post-Glorious Revolution period do not appear to have triggered the decline in the risk premium. Instead, the change in military expenditures over the period account for a 30% drop, on average, in the interest rate differential.

financial markets during this period.

Further research in this area should examine more closely the role played by the Bank of England in extending loans to the government and Whig-Tory attempts to manipulate Parliamentary and Crown financial decisions.

The qualitative and quantitative analysis substantiates the belief that a mature capital market did not develop in England until well into the eighteenth century. The research demonstrates that government interest rates on long-term loans remained considerably higher than similar private rates until almost thirty years after the reforms of the Glorious Revolution. Additional support for this claim is found in the analysis designed to remove inflationary expectations from the government interest rate and examine the trend in real government interest rates over the period. Also, the analysis shows that the sharp rise in interest rates in 1693 and in 1710, and the subsequent decline in rates by 1697 and by 1713, respectively, can be explained by political events associated with the wars fought during those periods.

Moreover, the relationship between war and the interest rate differential suggests that the risks reflected in the high government rates were due to factors other than the inability of the Crown to make credible commitments, the increased liquidity gained from the creation of a secondary market for credit, or the stability of revenues from a revised tax system. The fears that the war might be lost and the government would default on its loans determined the riskiness of long-term loans. Indeed, military expenditures continued to influence the risk premium well into the eighteenth century.

As the analysis demonstrated, the risks associated with war continued to explain, to a large degree, the rise and the fall in the interest rate differential across the five major wars that England participated in between 1714 and 1800. Thus, the evolution of capital markets in post-Revolution England may have originated in the reforms of the late seventeenth century, but the beneficial effects were not immediate, and they were influenced by factors other than the institutional innovations of the period or the liquidity of the long-term assets.

Table 1: 17th and 18th Century Wars Involving England

1689-1697	Nine Years War
1702-1713	War of Spanish Succession
1739-1748	War of Austrian Succession
1756-1763	Seven Years War
1775-1784	American War

Source: Brewer (1989)

Table 2: Major Military Setbacks and Long-Term Borrowing

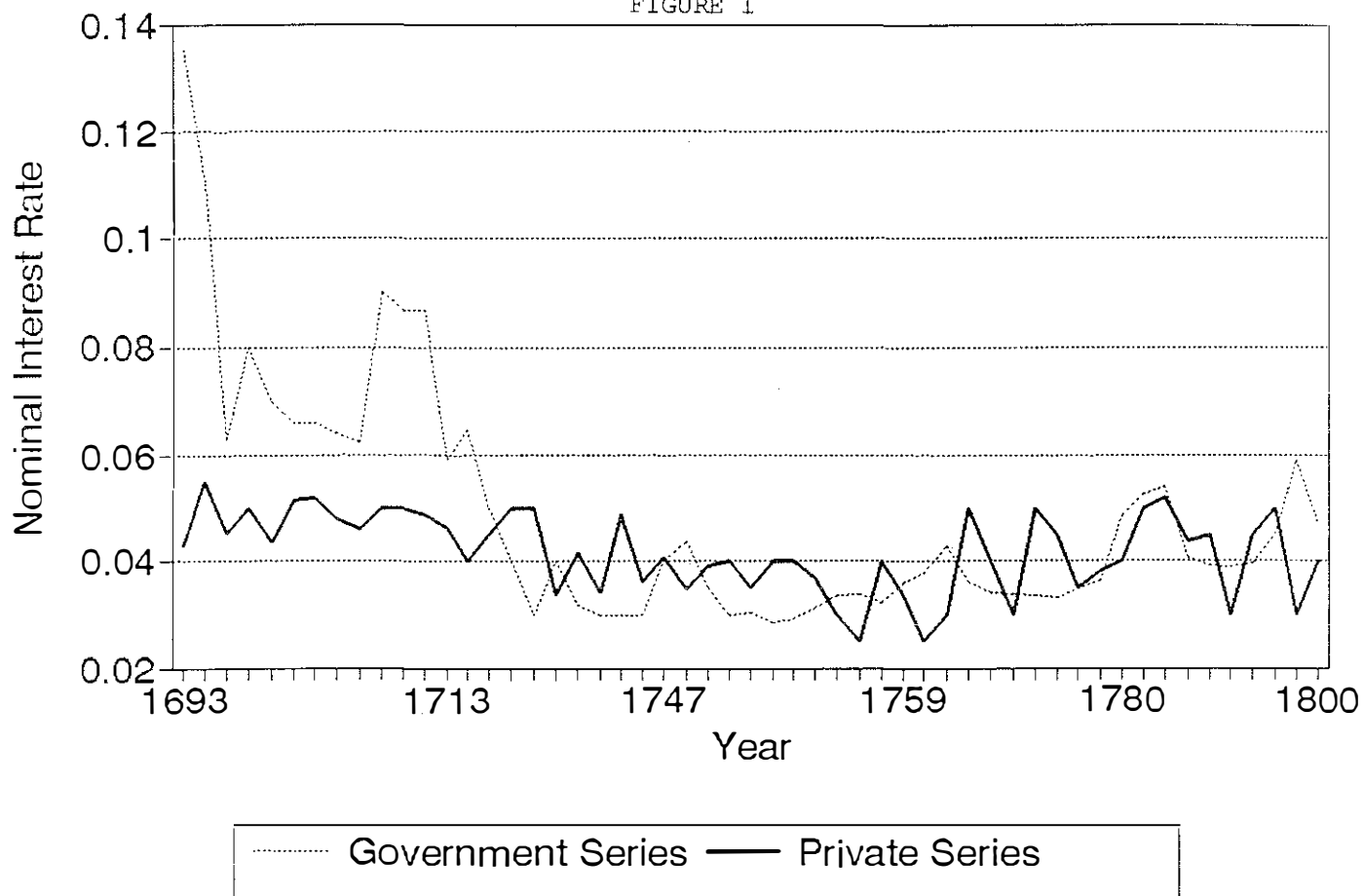
Date	Sum Raised (£)	Event
1689		-War declared against France
1691		-France captures Mons
1692		-France captures Fortress of Namur
Jan. 1693	108,100	-(1) Long-term lottery loan issued at interest rate of 10% (failed to raise funds)
	773,394	-(2) Long-term annuity issued at 14%
Winter 1693-94		-Bloody defeat of British army at Landen
Feb. 1694	118,506	-Long-term annuity issued at 14%
Mar. 1694	1,000,000	-Long-term lottery loan issued at 14%
Apr. 1694	1,200,000	-(1) Long-term annuity issued at 8% plus incorporated as member in Bank of England
	300,000	-(2) Long-term annuities issued at 14%, 12%, and 10% for one, two and three term lives, respectively.
1697		-Peak year in military expenditures (height of war)
Apr. 1697	17,630	-Long-term lottery loan issued at 6.3% (failed to raise funds)
Sept. 1697		-End of War with France
Jul. 1698	2,000,000	-Long-term annuity issued at 8%
Sources: Dickson (1967), Harris (1963)		

Table 3: Interest Rate Differential Regressed On Military Expenditure and Dummy Variables

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
one	0.022	0.004	4.44
Military Expenditure	0.212	0.068	3.15
d(1727-1800)	-0.007	0.007	-0.92
d(1714-1800)	-0.026	0.008	-3.26
Number of Observations:	53		
R-Squared:	0.5838		
one	0.064	0.007	8.69
Military Expenditure	0.190	0.048	3.93
d(1697-1800)	-0.049	0.007	-6.47
d(1714-1800)	-0.025	0.003	-7.18
Number of Observations:	53		
R-Squared:	0.7718		
one	-0.001	0.000	-0.00
Military Expenditure	0.188	0.046	4.11
d(1697-1800)	0.016	0.000	0.00
d(1714-1800)	-0.024	0.003	-7.57
Number of Observations:	51		
R-Squared:	0.6245		

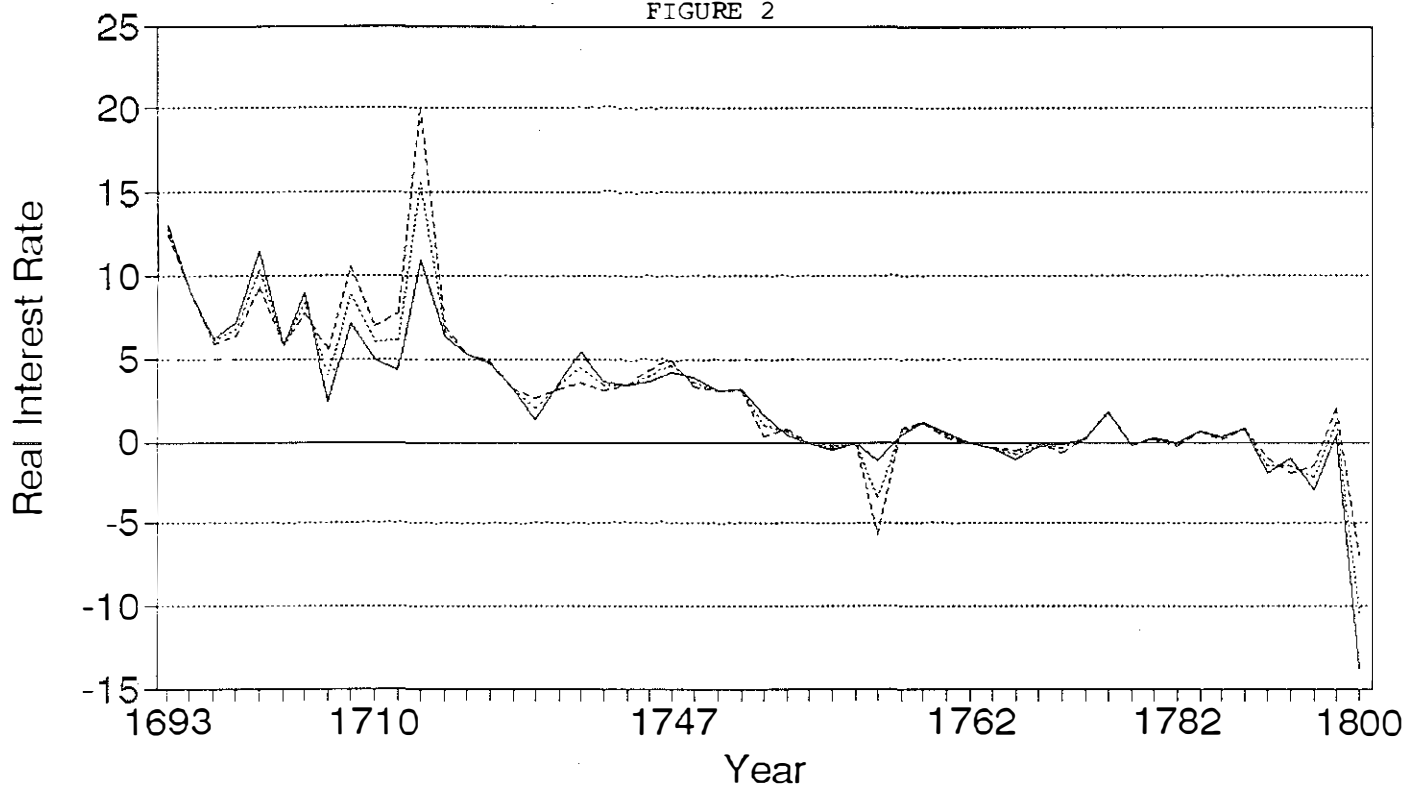
British Long-Term Interest Rates (1693-1800)

FIGURE 1



British Long-term Interest Rates (1697-1800)

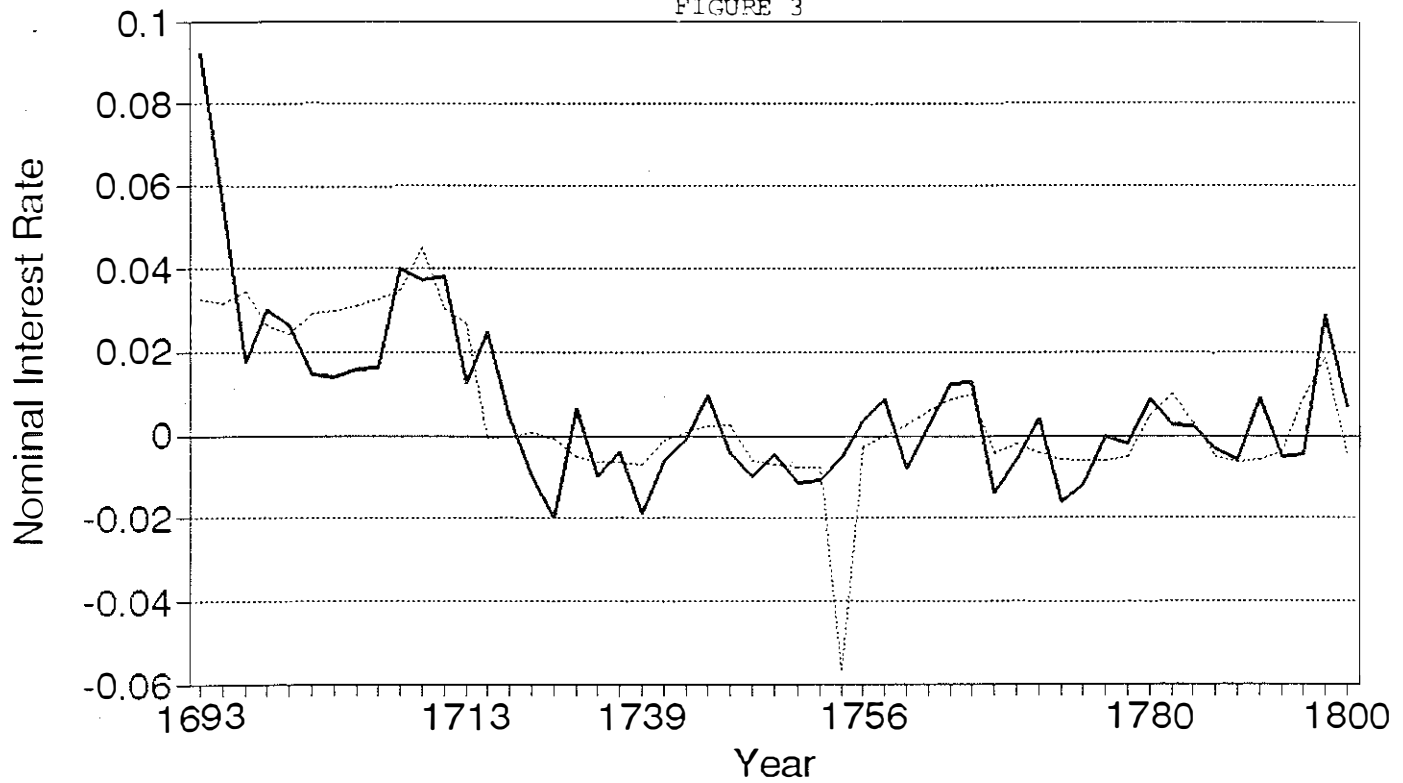
FIGURE 2



..... Equal weight Increasing Weight — Decreasing Weight

Predicted versus Actual Interest Rate Differential Values

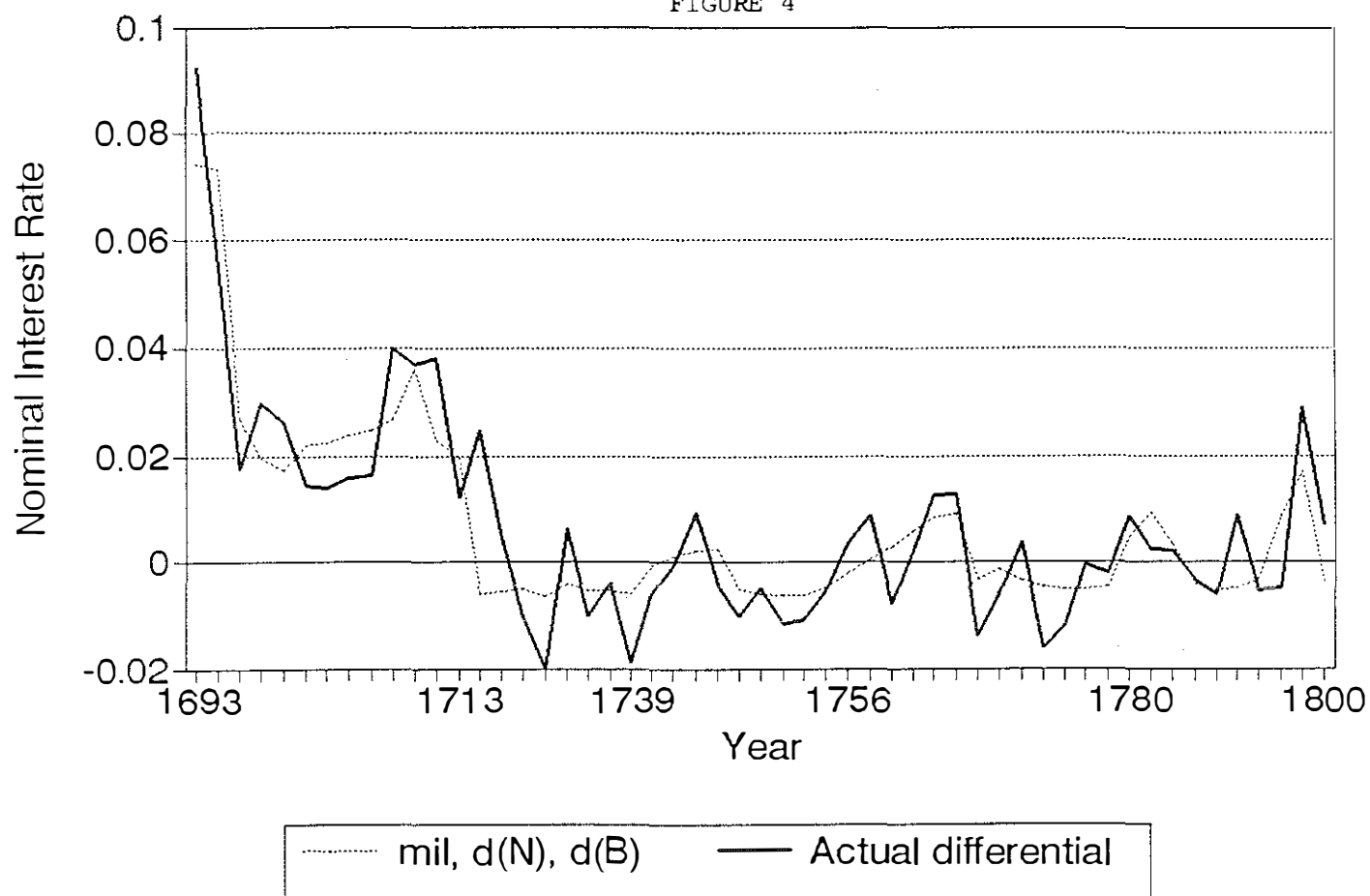
FIGURE 3



..... mil, d(NW), d(B) — Actual differential

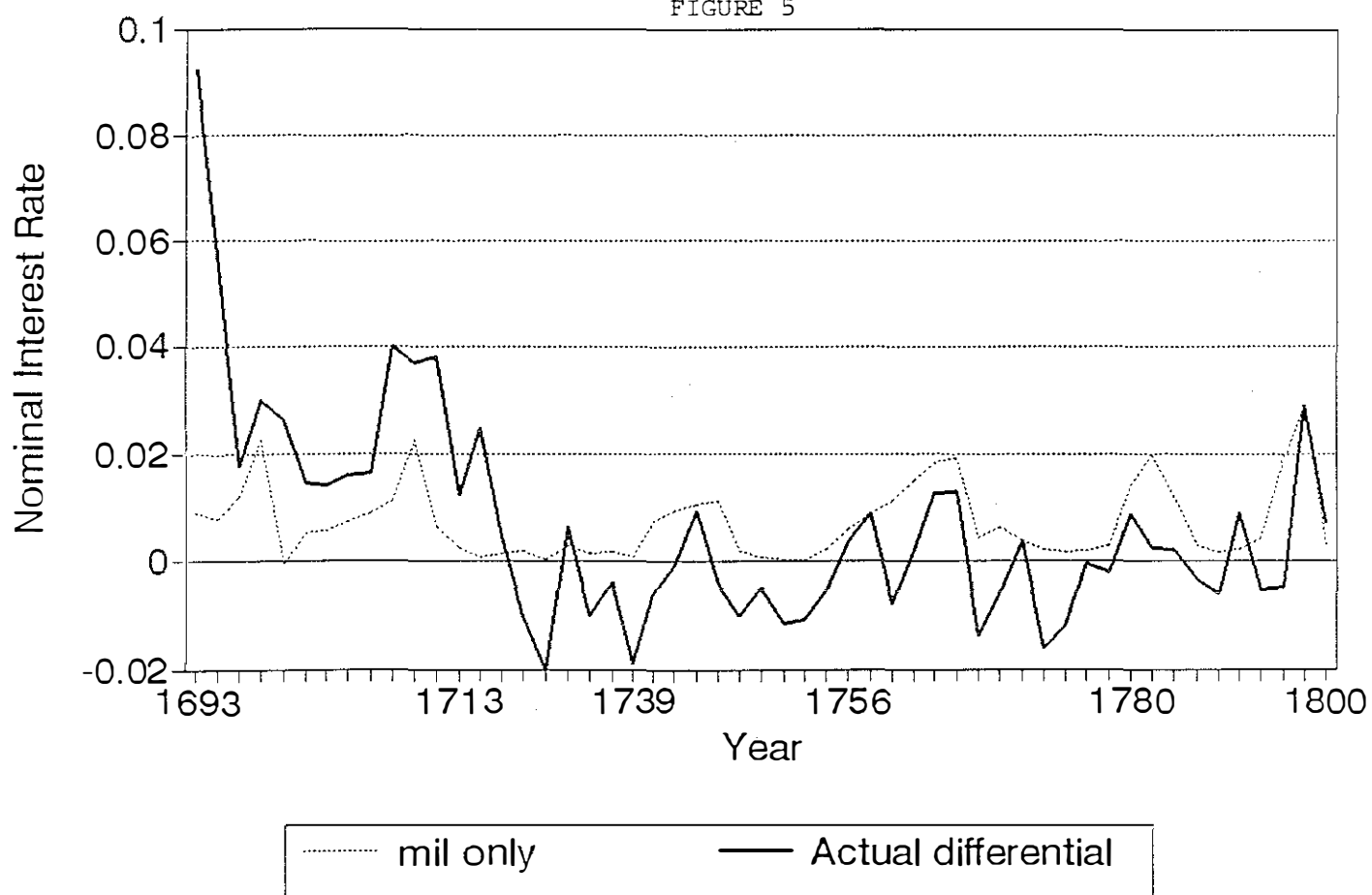
Predicted versus Actual Interest Rate Differential Values

FIGURE 4



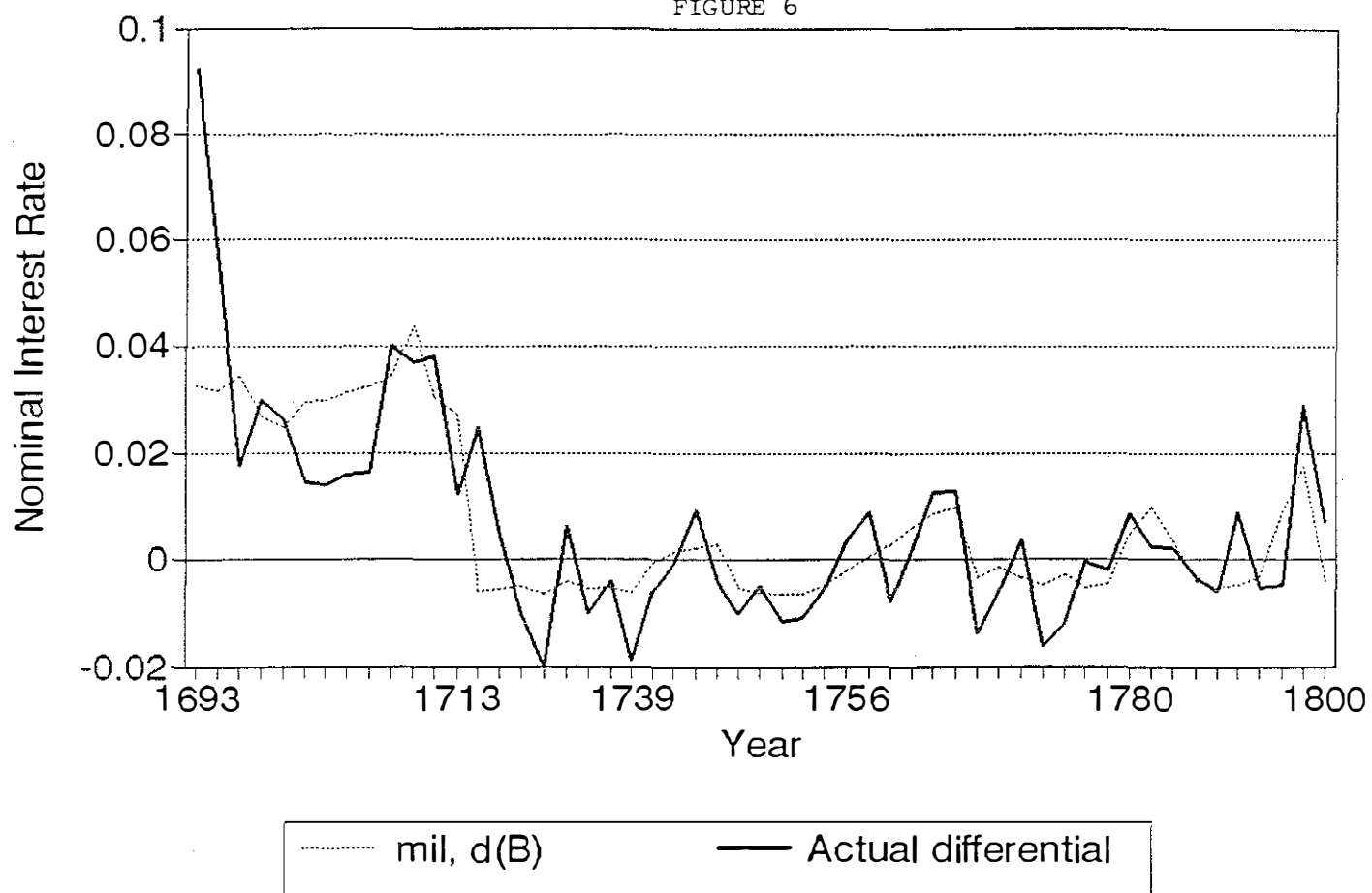
Predicted versus Actual Interest Rate Differential Values

FIGURE 5



Predicted versus Actual Interest Rate Differential Values

FIGURE 6



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